STANDARDS AND STANDARDIZATION

ECONOMIC USE OF RESOURCES

BY

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'Economic use of resources' is highly topical at the moment on account of inflation, the energy crisis, and above all the defence cuts. For some years now the MOD has been becoming more conscious of the need for better management so as to economize in manpower, material and money while keeping abreast of development. This has led to the introduction of such things as planned maintenance, SUIS, configuration control, and the recognition of work study, value engineering, etc. All of these have been of help in particular areas but the problem of how to make the most effective use of limited resources of manpower and money has still not been solved. There is available to the MOD a wealth of knowledge and experience both ashore and afloat of what is needed to produce a good ship. This knowledge and experience needs to be harnessed; basically, it is a problem of communication.

On the material side considerable economies would result if we could:

(*a*) avoid going over the same ground and making the same mistakes;

(*b*) use as many items as possible that are in common industrial use;

(*c*) avoid the use of 'specials' unless they are absolutely necessary;

(*d*) take advantage of experience gained.

These aims are not peculiar to the Ministry of Defence but apply equally to industry in general; here it has been recognized both nationally and internationally that these aims are best met by the creation of 'standards' and through them achieve standardization.

Standards and Standardization

The need for greater standardization in defence equipment has been stated frequently and in many places over the last few months; it is doubtful however whether many people realize what is meant by standardization and what the implications are. A common view is that standards and standardization are the enemies of development and should be avoided at all costs because they insist that all should be uniform and therefore oppose change. Certainly this could happen if standardization were applied without thought; this is neither the aim nor is it necessary. Nothing is so constant as change and so one of the main aims of standardization is to encourage useful change and avoid unnecessary change. This can be achieved by assessing proposed changes and implementing them through a structure of written standards constantly updated.

By standards is meant basic technical documentation which broadly falls into the following three types:

(*a*) Mandatory or specification type documents.

(*b*) Guidance documents, i.e. design guide or code of practice.

(*c*) List type documents, i.e. preferred ranges of items.

Standards record the result of experience so that the lessons learnt are not forgotten; this avoids going over the same ground again and repeating the

same mistakes. This is true even if the configuration of the ships of the future differs widely from present designs observing that they will still have to operate under the same environmental conditions. Standards are a means of communication, and to be effective they must be simple to use, accurate to ensure confidence in their use, and because change is inevitable they must also be flexible.

Standards then provide the basis for preparing definitive statements of requirements and class specifications, and also general guidance information to ease the task of designers. Thus a good set of standards can lead to sensible standardization; this can reduce the number of 'specials' and limit variety which in turn will greatly simplify the overall support problem during the life of the equipment.

Industrial Standards

Obviously the nearer MOD standards are to industrial standards the less the need for 'specials' with their consequential penalties of time and money in procurement and support. One way of achieving this is through British standards; here it is necessary briefly to consider the whole set-up of standards both nationally and internationally to understand where MOD standards fit into the picture.

International Standards

There are many international bodies concerned with international standardization but the two main ones are the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) which is the electrotechnical counterpart of ISO. ISO comprises national standards bodies of 57 countries plus 15 correspondent members, and has 145 technical committees, over 490 sub-committees, and 600 working groups. Over 40 countries are represented on IEC which has 69 technical committees and 112 sub-committees. Between them they have issued some 3500 standards and there are about 2000 in the pipe line. The majority of these are in metric units.

The European counterparts of ISO and IEC are the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) who prepare European standards within the EEC and EFTA areas.

ISO has defined the aims of standardization as the promotion of:

(*a*) overall economy in terms of human effort, materials, power, etc. in the production and exchange of goods;

(*b*) the protection of consumer interest through adequate and consistent quality of goods and services;

(*c*) the safety, health and protection of life;

(*d*) the provision of a means of expression and of communication between all interested parties.

These aims are sensible and indeed are identical to those of the MOD.

National Standards

The British Standards Institution (BSI) is the U.K. national standards body and in fact is the oldest such body. It organizes U.K. representation on international committees and publishes agreed international standards as national standards. It has some 4400 committees and has published about 7000 standards of which nearly 20 per cent. give effect to international

standards. In general British standards are advisory not mandatory. However, there has recently been more emphasis on those standards that affect health and safety and also those that prevent pollution of the environment; this has led many countries to incorporate such standards in their legislation —a trend that is likely to continue.

U.K. representation on international committees comes almost entirely from industry which has realized that standards can have a great effect on trade and therefore that it is important to play an active part in the creation of these standards. The possibility of successfully 'going it alone' these days is very limited.

Military Standards

NATO is engaged in standardization activities which result in standardization agreements (STANAGs); many of these deal with operational matters but the proportion concerned with *matériel* is increasing. STANAGs are implemented through national defence documentation.

There is also an area of standardization activity aimed at providing standardization of engineering materials and practices between the navies of America, Britain, Canada and Australia known as ABCA Field Z. This began in 1950 as an activity between the first three mentioned navies, Australia joining in November 1971. At present there are some 40 main projects, largely concerning the exchange of information, that have resulted in 38 ABC or ABCA standards. These are implemented by the issue of defence standards where applicable.

Defence Standards

These are controlled and issued by the Directorate of Standardization (D. Stan), and their use is mandatory within the MOD. D.Stan co-ordinates MOD representation on BSI committees and also co-ordinates MOD comments on draft British standards. It is to the advantage of the MOD to make maximum use of British standards so that the need to depart from national standards is reduced to a minimum, thereby avoiding wherever possible the use of items 'special to defence'; these not only cost more to procure but also invariably produce a support problem in the long run. As a corollary it is MOD policy to pay a full part in the making of British standards by appointing representatives to all appropriate BSI committees with the aim of having defence requirements incorporated to a maximum extent.

If no suitable British standard exists or an existing one needs qualifying for MOD use, the D.Stan produces a defence standard which may be either general or in some cases applicable to one Controllerate only. In principle Controllerates produce their own standards only if no suitable British or defence standard exists or such standard needs qualifying.

D.Stan also has the overall task of advising and co-ordinating Controllerates in the standards field. The importance of standardization of *matériel* has led to the formation of the Defence Matériel Standardization Policy Committee (DMSPC) chaired at high level in MOD(PE) with representatives from each Controllerate. Under this committee, there are the following committees each of which is chaired personally by the Director of Standardization:

(*a*) Defence Matériel Standardization Policy Sub-Committee (DMSPSC).

(*b*) Defence Engineering and Equipment Standardization Committee (DEESC).

(*c*) Defence Electrical and Electronics Standardization Committee (DELSC).

(*d*) Defence Technical Procedures Committee (DTPC).

(*e*) Defence Metrication Committee (DMC).

The DEESC and DELSC have various sub-committees which deal with particular aspects of *matériel* standardization. The DTPC is investigating means of rationalizing the ways in which the MOD does business with industry so that common procedures may be adopted where this would be of advantage. The DMC is considering the problems raised by metrication and where necessary is advising Controllerates.

Departmental Standards

It is a large task to create within a Controllerate a rationalized set of standards that will serve the needs of designers and manufacturers and will also make maximum use of British and defence standards (and hence, by inference, international standards); if, however, the worthwhile aims of standardization are to be achieved, it is important that this is done. Such standards must be kept up to date and must take account of experience if they are not soon to lose their usefulness. A dynamic not a static approach is required.

For weapons, a degree of rationalization of basic documentation has been achieved resulting in the publication of several naval weapons specifications (NWS). In the Ship Department, there are the two basic specifications, namely the General Hull Specification (GHS) and the General Marine Engineering Specification (GMES), supported by numerous other Ship Department documents. There is a need to rationalize all these documents into a coherent set of standards to meet the needs of project management and system design. First, however, there has been a need to sort out the electrical documentation where there were only Standard Electrical Specifications (SES) on individual subjects but no central document such as the GHS or GMES.

General Electrical Standards (GLS)

In deciding whether to go for a large single document or for a set of documents the various points already mentioned were considered. It was concluded that the aims would best be achieved by a set of documents to be known as the general electrical standards (GLS) linked together by a logical numbering system into which the other Ship Department technical standards would be incorporated eventually. The word 'standards' was chosen in preference to 'specifications' because the set of documents would cover specifications, guides, and lists of preferred ranges of components and equipments, i.e. a set of basic design documents.

Inspection of the documents that would have to be incorporated into GLS showed that they could conveniently be divided into five levels:

1. Systems/Installation.
2. Equipments.
3. Components.
4. Materials and Processes.
5. Documentation, e.g. drawing procedures, test schedules.

Each of these levels is then divided into categories and each category into individual standards. Two figures are allocated for categories and so far the following ten have been allocated for electrical purposes:

51. Common.
52. Power.
53. Internal communications and entertainment.

54. Electronics.
55. Lighting.
56. Cooking, heating and ventilation.
57. Monitoring, including measurement and instrumentation.
58. Weapons, counter-measures and associated equipment.
59. Ship control and navigation.
60. Machinery and machinery control.

It is clear that the electrical categories can be limited to twenty and there would seem to be no problem in similarly limiting constructive and mechanical engineering standards. In such a two-digit system, this would leave the final thirty categories (i.e. 71 to 99) to be allocated to a set of general engineering standards for matters concerning two or all of the three professions.

If it is ultimately decided to adopt this type of structural breakdown for all the Ship Department technical documentation, then categories could be allocated as follows:

Constructive	01—25
Mechanical	26—50
Electrical	51—70
General	71—99

Three figures have been allocated to define an individual standard within a category and since, taking into account levels and categories, the system allows for a very large number of individual standards, it was decided that it would be helpful if the final figures were allocated in a similar fashion as follows:

Constructive	001—248
Mechanical	251—498
Electrical	501—708
General	711—998

A typical number for an electrical standard would be GLS 2—51—501 which would mean:

Level 2 which is Equipment,
Category 51 which is Common,
Serial number 501.

For serial numbers, odd numbers denote specifications, i.e. mandatory type documents, and even numbers denote guides and lists. The foregoing example is a specification and its title is *Specification for General Application to the Design of Electrical Equipment.* GLS 2—51—502 could be the associated guide if such was ever necessary. Similarly 503 and 504, 505 and 506, etc. would be pairs. It may be that there will be a guide but no associated specification or vice versa, but the unused number will remain available in case it is decided to produce the other half of the pair at a later date.

Work is now in hand with the aim of having a useful set of General Electrical Standards for contract purposes by the end of 1975, even though the whole set of GLS will not be available by then.

A document in the new series will be easily identified not only from the number but also because the front page is yellow. Where a GLS calls up another GLS which is not yet printed, an inserted slip will indicate which existing documents are to be used in lieu during the interim period.

It is the overall responsibility of the Standards Section of the Ship Department to co-ordinate all GLS and to ensure that they are kept up to date. A separate sponsor from within Ship Department will be responsible for the technical contents and for up-dating each GLS. In this way it is hoped to

create a useful set of documents which will be kept abreast of technological change.

DGW(N) is being kept informed of progress on GLS and relevant drafts are sent to him for comment, with the thought that eventually a combined set of standards could be produced. The first task, however, is to create the GLS and establish the validity of the principles. With some experience a decision can be made on the extent to which the scheme can be developed to cover the whole of C of N's Controllerate.